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The effect of large-scale teleconnection patterns on Mediterranean wind storms

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This paper investigates the effect of large-scale teleconnection patterns on Mediterranean wind storms during the extended winter season from October to March. Due to the relatively coarse resolution of GCM simulations, the identification of large-scale patterns that favour the occurance of extremes is important for deriving information about extremes e.g. under climate change.

The wind storms are detected by identifying spatial and temporal persistent areas of adjacent grid boxes with wind speeds exceeding the local 98th percentile using the 10m wind field of the ERA40 reanalysis dataset. The wind clusters are tracked using a nearest neighbour approach. Events affecting at least three grid boxes and lasting for at least 18 hours are considered.

Large-scale teleconnection patterns that are known to have an influence on Mediterranean climate are for example the North-Atlantic Oscillation, the East Atlantic / West Russian Pattern and the Scandinavian pattern. It is shown that, of these three analysed patterns, the NAO exhibits the strongest influence on Mediterranean winter storms. The positive phase of the NAO is associated with a decrease in the number of wind storms in the south-western Mediterranean region and an increase in the middle and eastern parts. The positive phase of the East Atlantic / West Russian pattern is associated with a decrease in the number of winter storms in the western Mediterranean region and an increase in the east. More wind events occur over most of the Mediterranean region during the negative phase of the Scandinavian pattern than during its positive phase.

The long-term positive trend in the NAO during the ERA40 period is well reflected in long-term change patterns of the number of wind events in the Mediterranean: a decrease in the number of wind events in the south western Mediterranean region and an increase at the south eastern Mediterranean shore.